REMARKS/ARGUMENTS

Claims 17-29 are withdrawn from consideration as being directed to a non-elected invention. Claims 1-12 and 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mandelman et al. US patent No. 6,605,838, in view of Dyer, US patent No. 6,747,306. Claim 13 is rejected under 35 U.S.CO. 103(a) as being unpatentable over Mandelman et al. US patent No. 6,605,838, in view of Ozaki, US patent No. 5,519,236.

1. Cancel of claims 17-29:

According to the above-identified Office action, claims 17-29 are canceled. Consideration of claims 17-29 is no more requested.

2. Rejection of claim 14 under 35 U.S.C. 112:

Claim 14 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is not clear as to what applicant is trying to claim when stating "the second contact plug further contacts the STI as a first side of the second contact plug while contacts the annular spacer at a second side of the second contact plug, the second side being opposite to the first side of the second contact plug."

Response:

Claim 14 is amended for definitely pointing out the subject matter which applicants regard as the invention according to the requirement of Examiner. As referring to Fig.1, the amended claim 14 describes that the second contact plug 156 is positioned above a portion of the STI 146 (the right part of the STI 146) and the second contact plug 156 also directly contacts the STI 146 and the annular spacer 150 near the STI 146 at the same time. Acceptance of the amended claim 14 is politely requested.

3. Rejection of claims 1-12 and 15-16 under 35 U.S.C. 103(a):

Claims 1-12 and 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mandelman et al. US patent No. 6,605,838, in view of Dyer, US patent No. 6,747,306 for reasons of record, as cited on pages 3-7 of the above-identified Office action.

Response:

According to claim 1 and Fig.1 of this application, claim 1 describes the characteristics: (1) the annular drain 136 circularly encompasses the deep trench 120 near a surface of the substrate 110, next to the STI 146; and (2) *the STI 146 completely compasses the vertical transistor 168 and separates the annular drain 148 from other annular drains of any adjacent vertical transistors in the substrate 110.* Therefore, *the STI 146 completely encircles the memory cell 168, 166,* and *the annular drain 136 of each vertical transistor 168 is completely isolated by the STI 146 from other vertical transistors,* as shown in Fig.1 and described in claim 1.

According to pages 3-4 of the Office action, Examiner admits that Mandelman does not teach that a shallow trench isolation (STI) is positioned around the deep trench; the gate conductive layer is electrically connected to a first contact plug and the annular drain being electrically connected to a second contact plug and the annular trench positioned next to the STI, the STI completely compassing the vertical transistor and separating the annular drain from other annular drains of any adjacent vertical transistor in the substrate.

Referring to Figs.1-4 of Dyer's application, he only discloses a single STI 124 near a side of the DRAM storage cell 100. However, Dyer does not mention or show other STIs at another side of the DRAM storage cell 100. Regarding the description of the STI 124, Dyer only disclose "A pad nitride strip (following the formation of isolation trenches, e.g., trench 124) will then remove the spacer material, thereby leaving a divot surrounding the gate contact 122 and above poly-gate 114 (col.3, lines 32-35)." Therefore, Dyer does not clearly describe the structure, position, or function of the STI 124 and *is silent about the STI 124 completely compass and isolate the*

storage cell 100. Furthermore, in Fig.4, Dyer mentions that *the isolation trenches 206 are used to* ***separate the active areas 202 from adjacent columns*** (col.4, lines 14-20), *but never teaches that the isolation trenches 206 completely encircle each storage cell 100 to isolate the annular drain 118 from other drains of adjacent storage cells.* Accordingly, the structures and positions of the isolation trenches 206 or 124 in figures or specifications of Dyer's application are quite different from the STI 146 limited in claim 1 of this application.

Since Mandelman never teaches a STI structure and Dyer never teaches an isolation trench having a position or a structure similar to that of the STI in claim 1 of this application. The combination of Mandelman and Dyer's applications cannot complete all the laminations in claim 1 of this application. Accordingly, applicants believe claim 1 is allowable. Reconsideration of claim 1 is politely requested.

Regarding claim 6, claim 6 describes a characteristic of this application that the vertical DRAM 100 further comprises *a conductive layer 144 located on the gate conductive layer 134 for electrically connecting the gate conductive layer 134 and the first contact plug 156'* (Fig.1). However, Dyer only discloses a gate contact 122 on the gate electrode 114, wherein *there is no other conductive layer located between the gate contact 122 and the gate electrode 114 for electrically connecting the gate electrode 114 and the gate contact 122*. Therefore, the combination of Dyer and Mandelman's applications do not obtain the structure claimed in claim 6 of this application so that claim 6 should be allowable. Reconsideration of claim 6 is hereby requested.

Regarding claim 12, claim 12 is listed below for describing the difference between claim 12 and the cited references. Claim 12: "The vertical DRAM of claim 1, wherein the vertical DRAM further comprises an annular spacer (150) **surrounding** the entire upper trench portion (120, 160 in Fig.1)." Therefore, the annular spacer 150 is positioned out of the deep trench 120, not inside the deep trench 120. However, *the annular spacer 126 of Dyer's application is positioned inside the deep trench 102 and the gate dielectric layer 116 on the inner surface of the sidewall of the deep trench*

102. Therefore, Dyer's annular spacer 126 does not surround the entire upper trench portion 102 but is positioned inside the deep trench 102 so that applicants believe the annular spacer of Dyer's application is different from the annular spacer in claim 12 of this application. Accordingly, the combination of Dyer and Mandelman's application cannot complete all the limitations of claim 12, and claim 12 should be allowable. Reconsideration of claim 12 is politely requested.

Regarding claim 15, claim 15 describes that the annular spacer 150 is positioned on the outer surface of the sidewall of the upper trench portion 160 (Fig.1). However, the annular spacer 126 in Dyer's application is positioned on an inner surface of the deep trench 102 (Figs.1-3), which is corresponding to the spacer 142 of this application, not to the annular spacer 150. Therefore, claim 15 should be allowable. Reconsideration of claim 15 is respectfully requested.

Claims 2-5, 7-11 and 16 are dependent upon claim 1 so that claims 2-5, 7-11 and 16 should be allowable if claim 1 is allowable. Reconsideration of claims 2-5, 7-11 and 16 is hereby requested.

4. Rejection of claims 13 under 35 U.S.C. 103(a):

Claim 13 is rejected under 35 U.S.CO. 103(a) as being unpatentable over Mandelman et al. US patent No. 6,605,838, in view of Ozaki, US patent No. 5,519,236. Regarding claim 13, Mandelman teaches substantially in the entire claimed structure of claim 1 above except explicitly stating that the second contact plug has an asymmetric structure, which is positioned on the spacer and the drain while contacts the spacer and the drain at the same time.

Ozaki teaches (fig.2A) an asymmetric contact plug, which is positioned on the spacer (23) and the drain (24) while contacts the spacer and the drain at the same time (fig. 2A).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the asymmetric contact plug structure taught by

Ozaki in the combined structure of Mandelman and Dyer in order to make contact structure for further integrating the device.

Response:

Claim 13 is amended for correcting a typo error. The term "annular" is added to clearly describe the subject matter "annular spacer". Acceptance of the amended claim 13 is politely requested. According to the amended claim 13 and Fig.1, the second contact plug 156 has an asymmetric structure because *the second contact plug 156 is positioned on the annular spacer 150 and the annular drain 136 while contacts the annular spacer 150 and the annular drain 136 at the same time.*

Referring to Figs.2A-9B of Ozaki's application, the source region 18 is positioned in the substrate at a side of the deep trench 28, wherein the source region 18 is a diffusion region. The drain region 24 is positioned in the substrate near the upper portion of the deep trench 28. Examiner points that the contact plug 25 is positioned on a spacer 23 in the Office action. However, the numeral 23 actually represents an **insulation film** buried in the deep trench 28 (col. 5, lines 18-21). Furthermore, the numeral 25 represents a bit line layer positioned on the drain 24 and the insulation film 23. As shown in Fig.9B and col. 5, lines 16-25, those skilled in the art would easily recognize that the insulation film 23 is not defined as a so-called "spacer". And the insulation film 23 *does not have an annular shape* that encompasses the deep trench 28. On the other hand, none of the cited prior applications disclose forming an annular spacer encompassing or surrounding a deep trench. Therefore, the combination of the cited prior applications never disclose that an annular spacer surrounds a deep trench and has an asymmetric structure while a contact plug locates on the annular spacer and an annular drain at the same time. Accordingly, claim 13 should be allowable. Reconsideration of claim 13 is politely requested.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Sincerely yours,

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